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| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
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| 09/658,928 | 09/11/2000 | Shinichiro Kotake | 080542/0153 | 4017 |
| 22428 | 7590 | 03/11/2003 | EXAMINER | |
| FOLEY AND LARDNER SUITE 500 3000 K STREET NW WASHINGTON, DC 20007 | | | VANOY, TIMOTHY C | |
| | | ART UNIT | PAPER NUMBER | |
| | | 1754 | 5 | |
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Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

| | | |
|-------------------|------------------------|--|
| Application No. | Applicant(s) | |
| 09-658,928 | KOTAKE ET AL. | |
| Examiner VANDY | Group Art Unit 1754 | |

—The MAILING DATE of this communication appears on the cover sheet beneath the correspondence address—

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE THREE MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, such period shall, by default, expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

THE PRELIMINARY AMEND'T. DATED SEPT 11 2000

Responsive to communication(s) filed on _____

This action is FINAL.

Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under Ex parte Quayle, 1935 C.D. 11; 453 O.G. 213.

Disposition of Claims

Claim(s) 9 - 30 is/are pending in the application.

Of the above claim(s) _____ is/are withdrawn from consideration.

Claim(s) _____ is/are allowed.

Claim(s) 9 - 30 is/are rejected.

Claim(s) _____ is/are objected to.

Claim(s) _____ are subject to restriction or election requirement

Application Papers

The proposed drawing correction, filed on _____ is approved disapproved.

The drawing(s) filed on SEPT 11, 2000 is/are objected to by the Examiner.
FIGS 1-8 FILED ON SEPT 11 2000 ARE APPROVED BY THE EXAMINER

The specification is objected to by the Examiner.

The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. § 119 (a)-(d)

Acknowledgement is made of a claim for foreign priority under 35 U.S.C. § 119 (a)-(d).

All Some* None of the:

Certified copies of the priority documents have been received.

Certified copies of the priority documents have been received in Application No. 09-058,965.

Copies of the certified copies of the priority documents have been received

in this national stage application from the International Bureau (PCT Rule 17.2(a))

*Certified copies not received: _____

Attachment(s)

Information Disclosure Statement(s), PTO-1449, Paper No(s). 4

Interview Summary, PTO-413

Notice of Reference(s) Cited, PTO-892

Notice of Informal Patent Application, PTO-152

Notice of Draftsperson's Patent Drawing Review, PTO-948

Other _____

Office Action Summary

DETAILED ACTION

Priority

Acknowledgment is made of applicant's claim for foreign priority under 35 U.S.C. 119(a)-(d). The certified copy has been filed in parent Application No. 09-058,965, filed on Apr. 13, 1998.

Drawings

Klop a) The brief description of figures 9 and 10 on pg. 18 in the applicants' specification indicates that the subject matter illustrated in figures 9 and 10 is prior art. If figures 9 and 10 are prior art, then they should be so labeled. Labeling a figure "related art" is not the same as labeling it "prior art".

Specification

- a) The status of 09-058,965 mentioned on pg. 1 in the specification has been updated by inserting --, now abandoned-- between "1998" and ":" via an examiner's pen and ink amendment.
- Well* b) The use of brackets in the abstract is objected to because they may confuse the printer about whether or not the disclosure within the brackets should be deleted or not. Brackets are normally used to indicate subject matter that should be deleted.

Claim Rejections - 35 USC § 112

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claim 27 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which the applicants regard as their invention.

a) In claim 27, the phrase "wherein the absorption tower, the reheating section and the fan comprise a stack" is vague and indefinite. Does this phrase mean that these components are "stacked" together to form serially arranged gas treatment units, or does this phrase mean that the exhaust stack comprises the absorption tower, the reheating section and the fan (which appears to be the case in view of applicants' figure 1). It appears that it may have been the applicants' intention to recite that the exhaust stack comprises the absorption tower, the reheating section and the fan.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

The person having "ordinary skill in the art" has the capability of understanding the scientific and engineering principles applicable to the claimed invention. The references of record in this application reasonably reflect this level of skill.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

Claims 9-12, 14-17 and 20-27 are rejected under 35 U.S.C. 103(a) as being unpatentable over the prior art process described on pgs. 1-5 in the applicants' specification and illustrated in applicants' figure 9 in view of U. S. Pat. 5,024,171.

The prior art process described on pgs. 1-5 in the applicants' specification and illustrated in applicants' figure 9 describes a process for removing NO_x and SO₂ out of a flue gas contaminated with NO_x, SO₂ and SO₃, comprising:

subjecting the flue gas to denitrification step with injected ammonia (B) in denitrifier (2) to produce a flue gas containing a diminished amount of nitrogen oxides and as little as 5 ppm residual ammonia;

passing the flue gas through an electrostatic precipitator (ESP) (5);

passing the flue gas through a heat exchanger (7), which extracts heat from the flue gas;

passing the flue gas through a desulfurization tower (8), where the sulfur dioxide within the flue gas is scrubbed with a limestone slurry to produce a gypsum-containing scrubbing solution and a flue gas having a diminished concentration of sulfur dioxide;

passing the flue gas through another heat exchanger (9), which heats the flue gas;

passing the flue gas through a fan (11), which imparts sufficient motive force to help push the purified flue gas through discharge stack (13) and into the atmosphere, in a manner fairly suggesting the limitations of at least applicants' claims 9, 12, 14, 20, 24 and 27.

The difference between the applicants' claims and the prior art process described in the applicants' specification is that applicants' claims 9, 10, 15, 16, 17, 23 and 25 call for injecting even more ammonia into the flue gas so that there is a greater excess of ammonia in the flue gas over and above the 5 ppm mentioned in the applicants' description of the prior art (for example, applicants' claim 10 sets forth that the concentration of ammonia in the flue gas is not less than 30 ppm).

U. S. Pat. 5,024,171 describes a similar process for removing contaminants out of flue gas emitted from the combustion of fuels, wherein col. 1 Ins. 38-40 reports that undesirable sulfuric acid emissions (resulting from the presence of SO₃ in the flue gas; please also see col. 1 Ins. 27-28) can be reduced by injecting ammonia into the flue gas, and col. 1 Ins. 50-54 reports that if too little ammonia is injected into the flue gas

the sulfur trioxide will react with the ammonia to form ammonium bisulfate, which forms a sticky liquid mass inside the ducts or equipment, rather than ammonium sulfate.

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made *to modify* the prior art process described in the applicants' specification *by increasing* the amount of residual ammonia present in the flue gas exiting the denitrification unit, in the manner set forth in the limitations of applicants' claims 9, 10, 15, 16, 17, 23 and 25, *because* of the expected advantage of the excess residual ammonia to react with and remove the sulfur trioxide present in the prior art's flue gas (please refer to pg. 2 Ins. 13-15 in the applicants' specification) in such amounts sufficient so as to produce the desired ammonium sulfate, rather than the undesired ammonium bisulfate, which is taught to plague the process by plating out on the surface of equipment and is attributed to too little ammonia in the gas (please see col. 1 Ins. 50-54 in U. S. Pat. 5,024,171: which would appear to be the case for the prior art process described on pg. 2 Ins. 1-2 in the applicants' specification).

Also, note that as a consequence of forming the desired ammonium sulfate set forth in col. 1 Ins. 50-54 in U. S. Pat. 5,024,171, U. S. Pat. 5,024,171 in col. 6 Ins. 22-24 also discloses that the ammonium sulfate powder may be removed with an electrostatic precipitator - in a manner rendering obvious the limitations of applicants' claims 21 and 22.

It is also submitted to have been obvious for one of ordinary skill in the art to measure and report the extent to which the gas has been denitrified in the prior art process modified by the manner set forth in U. S. Pat. 5,024,171, in the manner set

forth in applicants' claim 11, as evinced by the disclosure set forth on pg. 4 Ins. 18-20 in the applicants' specification. Similarly, it is also submitted to have been obvious to one of ordinary skill in the art at the time the invention was made to measure and report the extent to which the gas has been desulfurized in the prior art process modified by the manner set forth in U. S. Pat. 5,024,171, in the manner set forth in applicants' claim 26, as evinced by the disclosure set forth on pg. 4 Ins. 20-21 in the applicants' specification.

Claims 9-12 and 14-30 are rejected under 35 U.S.C. 103(a) as being unpatentable over the prior art process described on pgs. 1-5 in the applicants' specification and illustrated in applicants' figure 9 in view of U. S. Pat. 5,024,171, as applied to claims 9-12, 14-17 and 20-27 above, and further in view of the English translation of DE G93 19 017.4 U1 (hence "DE-017").

The difference between the applicants' claims and the prior art process is that applicants' claims 18 and 19 call for spraying the flue gas with a liquid at a location downstream of the desulfurization unit, and applicants' claims 28-30 set forth that the absorption tower, the reheating section and the fan comprise a stack (i. e. the exhaust stack comprises an absorption tower, a reheating section and a fan (please see applicants' fig. 1)?).

DE G93 19 017.4 U1 is drawn to the same art of cleaning the exhaust gas emitted from power plants, etc., however the process of DE G93 19 017.4 uses an exhaust gas stack that is equipped with a fan (15), a gas desulfurization unit (4) and then a gas reheating section (23) (please see fig. 1 and the description of the features

illustrated in figure 1 on pgs. 12 and 13 in the English translation of DE G93 19 017.4 U1). The middle of pg. 4 in the English translation of DE G93 19 017.4 U1 explains that the advantage of housing the flue gas desulfurization system (etc.) within the chimney is that the amount of space required by the apparatus is reduced (in a manner rendering obvious the limitations of at least applicants' claims 29 and 30 in as much as the prior art chimney is described as having dimensions of 150 x 38 meters in the paragraph bridging pgs. 4 and 5 in the applicants' specification) and material costs are reduced.

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made *to modify* the process resulting from the combination of the prior art process described in the applicants' specification in view of U. S. Pat. 5,024,171 *by inserting* the desulfurization unit (8), gas reheating unit (9) and fan (11) literally *within* the chimney structure (13) illustrated in the prior art process in applicants' figure 9, in the manner set forth in applicants' claims 18, 19 and 28-30, *because* of the taught advantage of such an arrangement as saving space and material costs, as set forth in the middle of pg. 4 in the English translation of DE G93 19 017.4 U1.

Claims 1-30 are rejected under 35 U.S.C. 103(a) as being unpatentable over the applicants' description of the prior art process set forth on pgs. 1-5 in the applicants' specification and illustrated in applicants' fig. 9 in view of U. S. Pat. 5,024,171 and the English translation of DE G93 19 017.4 U1 as applied to claims 1-12 and 14-30 above, and further in view of pgs. 9-50, 9-51 and 11-3 to 11-8 in the Chemical Engineers' Handbook (5th ed.) edited by Perry et al.

The difference between the prior art process described in the applicants' specification and the applicants' claims is that applicants' claim 13 sets forth the process uses a non-leaking shell and tube type heat exchanger (whereas the prior art process uses a Ljungstrom-type heat exchanger: please see pg. 2 Ins. 6 and 7 in the applicants' specification).

Pg. 9-50 in the Chemical Engineers' Handbook discloses that Ljungstrom-type heaters suffer from leakage, and pg. 11-3 in the Chemical Engineers' Handbook discloses that shell and tube-type heat exchangers constitute the bulk of unfired heat transfer equipment in chemical process plants (please see the 1st sentence).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made *to modify* the prior art process described on pgs. 1-5 in the applicants' specification *by substituting* the shell and tube-type heat exchangers mentioned on pg. 11-3 in the Chemical Engineers' Handbook *in lieu of* the Ljungstrom-type heat exchanger mentioned on pg. 2 Ins. 6 and 7 in the applicants' specification, in the manner set forth in applicants' claim 13, *because* of the expected advantage of avoiding the leakage problems associated with Ljungstrom-type heaters, as taught on pg. 9-50 in the Chemical Engineers' Handbook, by using the shell and tube-type heat exchanger.

The following references, which are indicative of the state of the art, are made of record:

U. S. Pat. 4,288,420 disclosing a method for removing NO_x and SO_x with ammonia, and

U. S. Pat. 5,567,226 disclosing a process for enhancing the performance of a particulate collection device.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Timothy C. Vanoy whose telephone number is 703-308-2540. The examiner can normally be reached on 8 hr. days.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Stanley Silverman, can be reached on 703-308-3837. The fax phone numbers for the organization where this application or proceeding is assigned are 703-872-9310 for regular communications and 703-872-9311 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-308-0661.

Timothy Vanoy/tv
March 6, 2003

Timothy Vanoy
Timothy Vanoy
Patent Examiner

Art Unit 1754